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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/584,838	06/27/2006	Yoshiyuki Shirakawa	128484	3451

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OLIFF & BERRIDGE, PLC
P.O. BOX 320850
ALEXANDRIA, VA 22320-4850

EXAMINER	
GREEN, YARA B	
ART UNIT	PAPER NUMBER
2884	
MAIL DATE	DELIVERY MODE
03/23/2009	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/584,838	SHIRAKAWA ET AL.	
	Examiner	Art Unit	
	YARA B. GREEN	2884	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *02 March 2009*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1,8-10,13 and 14* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1,8-10,13 and 14* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

1. This Office Action is in response to Applicant's Amendment filed March 2, 2009. Claims 1 and 10 have been amended. Claims 2-7 and 11-12 are cancelled. No new claims have been added. Currently, claims 1, 8-10, and 13-14 are pending.

Response to Amendment

2. Applicant's request for reconsideration of the finality of the rejection of the last Office action is persuasive and, therefore, the finality of that action is withdrawn.

Response to Arguments

3. Applicant's arguments, see page 5, paragraph 5 – page 6, paragraph 1,with respect to the rejection(s) of claim(s) 1 and 10 under 35 USC 103(a) have been fully considered and are persuasive. Therefore, the rejection has been withdrawn. However, upon further consideration, a new ground(s) of rejection is made in view of Brown (US 3,581,090), Ito et al. (US 5,118,948), Zelakiewicz et al. (US 2006/0065844), and Karellas (US 5,519,227).

Claim Rejections - 35 USC § 103

4. The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

5. **Claims 1** and **8-9** are rejected under 35 U.S.C. 103(a) as being unpatentable over Brown (US Patent No. 3,581,090; published May 25, 1971) in view of Ito et al. (US Patent No. 5,118,948; published January 2, 1992), Zelakiewicz et al. (US PreGrant Pub. 2006/0065844; filed September 30, 2004), and Karellas (US 5,519,227; published May 21, 1996).

Re **claims 1** and **9**, Brown discloses a direction finding radiation detector for detecting a direction of incidence of radioactive rays, the detector comprising:

three or more scintillators **23,24,25** (Figures 1 and 9), being arranged to overlap circumferentially at least in part so that they are shadowed by each other from radioactive rays incident in circumferential directions and so that light emitted from one of the scintillators is not incident on the other scintillators (col. 4, lines 42-48; col. 1, lines 36-44); the direction of incidence is detected all around in the range of 0° to 360° (col. 4, lines 40-47; Figure 1); photoreceptor devices **27** each having a light receiving surface optically coupled to each of the scintillators (col. 4, lines 57-64), wherein a combination of proportions of radioactive rays incident directly on the respective scintillators and radioactive rays incident indirectly, being shadowed by the other scintillators, varies with the direction of incidence circumferentially (col. 5, lines 68-73; col. 1, lines 35-44).

Brown does teach wherein the scintillators are connected to their respective amplifiers that may have different gains (col. 10, lines 70-75; col. 11, lines 24-28, lines 1-10). Although Brown discloses an analog system, converting and using a digital system is not precluded (col. 16, lines 10-16). In a similar field of endeavour, Ito et al. teach a digital processing circuit for output signals from a plurality of gamma ray detectors. Ito et al. disclose wherein analog to digital converters are operationally connected to their respective photodetector devices (col. 5, line 59 - col. 6, lines 10) which, in turn, are connected to a pulse height analyzer (col. 4, lines 45-50).

Ito et al. teach employing A/D converters for each signal line of the detector instead of single A/D converter. However, in a similar field of endeavour, Zelakiewicz et al. teach using a single A/D converter for converting the signals of photodetector array can be configured to process in real-time and therefore would not suffer any delays (para. 0017). One of ordinary skill in the art would have been motivated to use a single A/D converter, as taught by Zelakiewicz et al. in the

apparatus Brown, as modified Ito et al., that would still preserve the sampling frequency of the detector.

Ito et al. further teach using a multichannel pulse height analyzer (col. 4, lines 45-51). One of ordinary skill in the art would have been motivated to implement the pulse height analyzer of Ito et al. in the detector of Brown in order to process digital signals and ascertain the energies of the incident radiation.

Brown discloses the scintillator to be formed of three crystals symmetrically arranged circumferentially, but does not disclose the method in which the scintillator is formed (i.e. three separate crystals grown or a single slab cut into three), thereby allowing for that which is well known in the art. In a similar field of endeavour, Karellas teaches micromachining a slab of scintillator in a plurality of configurations in order to form pixels, including in a circumferential direction (col. 6, lines 14-25). One of ordinary skill in the art would have been motivated to implement the micromachining methods of Karellas to form the scintillator of Brown in order to precisely fabricate pixelated scintillator structures.

Re **claim 8**, the method recited requires the structural limitations of claim 1 and is therefore rejected similarly. Brown further teaches the method to measure a circumferential radiation using the direction finding radiation detector (col. 1, lines 35-45).

6. **Claims 10-14** are rejected under 35 U.S.C. 103(a) as being unpatentable over Brown (US Patent No. 3,581,090; published May 25, 1971) in view of Ito et al. (US Patent No. 5,118,948; published January 2, 1992), Deliwala (US Patent No. 7,339,170; filed July 16, 2003) and Karellas (US 5,519,227; published May 21, 1996).

Re **claims 10** and **13**, Brown discloses a direction finding radiation detector for detecting a direction of incidence of radioactive rays, the detector comprising:

three or more scintillators **23,24,25** (Figures 1 and 9), being arranged to overlap circumferentially at least in part so that they are shadowed by each other from radioactive rays incident in circumferential directions and so that light emitted from one of the scintillators is not incident on the other scintillators (col. 4, lines 42-48; col. 1, lines 36-44) and the direction of incidence is detected all around in the range of 0° to 360° (col. 4, lines 40-47; Figure 1); and photoreceptor devices **27** each having a light receiving surface optically coupled to each of the scintillators (col. 4, lines 57-64), wherein a combination of proportions of radioactive rays incident directly on the respective scintillators and radioactive rays incident indirectly, being shadowed by the other scintillators, varies with the direction of incidence circumferentially (col. 5, lines 68-73; col. 1, lines 35-44).

Brown does teach wherein the scintillators are connected to their respective amplifiers that may have different gains (col. 10, lines 70-75; col. 11, lines 24-28, lines 1-10). Although Brown discloses an analog system, converting and using a digital system is not precluded (col. 16, lines 10-16). In a similar field of endeavour, Ito et al. teach a digital processing circuit for output signals from a plurality of gamma ray detectors. Ito et al. disclose wherein analog to digital converters are operationally connected to their respective photodetector devices (col. 5, line 59 - col. 6, lines 10) which, in turn, are connected to a pulse height analyzer (col. 4, lines 45-50).

Ito et al. further teach employing A/D converters for each signal line of the detector instead of single A/D converter (col. 5, lines 13-20). Ito et al. further teach using a multichannel pulse height analyzer (col. 4, lines 45-51). One of ordinary skill in the art would have been motivated to

implement the pulse height analyzer of Ito et al. in the detector of Brown in order to process digital signals and ascertain the energies of the incident radiation.

Ito et al. do not teach wherein the A/D converters have different conversion rates. In a similar field of endeavour of image processing, Deliwala teach implementing A/D converters with different sampling frequencies in order to provide for the dynamic range of the incident radiation (col. 15, lines 11-51). One of ordinary skill in the art would have been motivated to use A/D converters with different sampling frequencies, as taught by Deliwala, in the apparatus of Brown, as modified by Ito et al., in order to provide a large dynamic range for detection.

Brown discloses the scintillator to be formed of three crystals symmetrically arranged circumferentially, but does not disclose the method in which the scintillator is formed (i.e. three separate crystals grown or a single slab cut into three), thereby allowing for that which is well known in the art. In a similar field of endeavour, Karellas teaches micromachining a slab of scintillator in a plurality of configurations in order to form pixels, including in a circumferential direction (col. 6, lines 14-25). One of ordinary skill in the art would have been motivated to implement the micromachining methods of Karellas to form the scintillator of Brown in order to precisely fabricate pixelated scintillator structures.

Re **claim 14**, the method recited requires the structural limitations of claim 10 and is therefore rejected similarly. Brown further teaches the method to measure a circumferential radiation using the direction finding radiation detector (col. 1, lines 35-45).

Conclusion

7. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. Wiener-Avnear et al. (US 6,586,702) teaches forming pixels in a scintillator by splitting a single scintillator in a circumferential direction.

8. Any inquiry concerning this communication or earlier communications from the examiner should be directed to YARA B. GREEN whose telephone number is (571)270-3035. The examiner can normally be reached on Monday - Thursday, 8am - 5pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Dave Porta can be reached on (571) 272-2444. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/David P. Porta/
Supervisory Patent Examiner, Art Unit 2884

Yara B. Green
/YBG/